

ABSTRACT

Method for selective fabrication of high capacitance density areas in a low dielectric constant material and related structure are disclosed. In one embodiment, a first area of a dielectric layer is covered, for example with photoresist, while a second area of the dielectric layer is exposed to a dielectric conversion source such as E-beams, I-beams, oxygen plasma, or an appropriate chemical. The exposure causes the dielectric constant of the dielectric layer in the second area to increase. A number of capacitor trenches are etched in the second area of the dielectric. The capacitor trenches are then filled with an appropriate metal, such as copper, and a chemical mechanical polish is performed. The second area in which the capacitor trenches have been etched and filled has a higher capacitance density relative to the first area. In another embodiment, the exposure to the dielectric conversion source is not performed until after the chemical mechanical polish has been performed. In yet another embodiment, a blanket layer of metal, such as aluminum, is first deposited. The blanket layer of metal is then etched to form metal lines. Then a gap fill dielectric is utilized to fill the gaps between the remaining metal lines. A first area of the gap fill dielectric is then covered and a second area of the gap fill dielectric is exposed to a dielectric conversion source. After exposure to the dielectric conversion source, the dielectric constant of the gap fill dielectric in the second area increases. The metal lines in the second area can then be used as capacitor electrodes of a high density capacitor.

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